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Special EP: Science Behind The Interstellar Space

Interstellar space

SPECIAL EP



ASTROPHYSICS: DEEP IN THE SPACE
WITH MAANVINDER PILANIA

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Science Behind The Interstellar Space

What do you think when you hear the word interstellar space? You probably think of the famous movie Interstellar. Now tell me what comes in your mind when you hear the word space? You probably think that the space is empty. Stars are so far away from each other and so most of the space is empty. But is it true?

Let me help break it down for you. Hi, I'm Maanvinder, your host of this podcast and I'm back with the season 2 of this podcast after two years and we are starting it with a special episode discussing about the interstellar space. The word interstellar is made up of two words- inter which means between and stellar means star. So Interstellar space is a place between the stars. Another question that arises here is where does it begin? So the correct answer based on the best available science is that, it starts where the star's constant flow of material and the magnetic field stop affecting its surroundings. To put it in simple terms, for us the interstellar space begins where the sun's constant flow of material and the magnetic field stop affecting its surroundings. And that place is called heliopause. And with the word material I meant electrons, solar wind, etc. It is the last boundary of a star up to where the star's magnetic field, and any flowing material stop affecting the bodies outside place. The solar wind from our Sun creates a bubble around our solar system and this is called heliosphere. We know about this by detecting the temperature and concentration of solar particles. Inside this bubble, the solar particles are hot but less concentrated compared to the place outside this bubble where particles are cold and are largely concentrated. This is where you enter the interstellar space. Welcome you have finally made it into the interstellar space.

So as I earlier said, the interstellar space is not empty. The interstellar space is largely made up of Hydrogen which accounts for 70%, next is Helium (28%) and the remaining 2% is heavier gases, interstellar dust, and elements that are thrown out into the space in a supernova. If you don't know heavier elements are born inside the stars and when the star dies, the blast out their outer shells, spewing all the materials out into the space. And it becomes a part of the interstellar space. If a particular region of the interstellar space has enough material for it to accumulate, then it can give birth to new stars in the stellar nurseries called the nebula.

The next question you might be wondering that has anyone or anything from our world entered the interstellar space? Well there is one. NASA's Voyager-1 mission in 2012 made history by becoming the first man-made object to leave heliosphere and entered the interstellar space. This was confirmed from the detectors onboard the probe which detected the change in the concentration and temperature of particles that were hitting the probe. Voyager-1 was launched in the year 1977 to study the gas giants of our solar system. It actually did not visit them but flew past them, gathering data about the

moons, their magnetic field, and most importantly rings. This is when it was discovered that Saturn is not the only planet with the ring system. Jupiter, Uranus and Neptune also have thin ring system around them. Now Voyager-1 is heading towards the Oort Cloud which is the last boundry of our solar system. It is a place where most of the long period comets origin from. It will reach the beginning in about 300 years and in 30,000 years it will exit our solar system completely. It will be lost in the vastness of deep space.

So why is interstellar space important? The simple answer is without it we wouldn't exist. Because it is a place where the stars are born in the thick region called molecular clouds- where there is so much material for it to accumulate and born as a star. Interstellar Space is also the place from where cosmic rays enter our solar system because when a star dies in a supernova explosion; it not only spews out elements but also the cosmic rays. During day and night there is a constant bombardment of these rays into the Earth's atmosphere. When cosmic rays collides with the atoms into Earth's atmosphere, all their energy is converted back to matter and shower down on Earth's surface. So this was it from me for this week. Thank you for listening. See you next week!

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